UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 5270

MSAS NO. 130

OVER THE

RED RIVER OF THE NORTH

DISTRICT 4 - CLAY COUNTY, CITY OF MOORHEAD

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 3215 (CEI 46)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 5270 included Piers 6 and 7. The concrete of the piers was in good condition with light to moderate scaling. No defects of structural significance were observed. The channel bottom exhibited local scour depressions at the upstream nose of Pier 7 and downstream nose of Pier 6, both of which have partially exposed the footing at each location. The river presently flows at a significant skew to Pier 7 and Pier 6.

INSPECTION FINDINGS:

(A) The first step of the upstream footing at Pier 7 was exposed with up to 1 foot of vertical face exposure.

(B) The first step of the downstream footing at Pier 6 was exposed with up to 6 inches of vertical face exposure.

(C) Light to moderate scaling with 1/8 inch typical penetrations and 1/2 inch maximum penetrations was observed on Piers 6 and 7 from 6 feet above the waterline to the channel bottom. There was also some 3 inch deep scaling with exposed reinforcing steel on the downstream nose of Pier 6.

(D) A light accumulation of timber debris was present around Pier 6 on top of the pier cap indicating that water levels have at some point exceeded the pier height.

(E) A moderate accumulation of timber debris, consisting of logs and branches up to 12 inches in diameter, was observed extending from the upstream nose to the midpoint of Pier 7. An 18 inch diameter log embedded in the channel bottom by its root ball was located at the downstream end of Pier 7.

(F) The bottom of the concrete diaphragm wall was exposed and undermined at the upstream nose of Pier 7, as well as the downstream nose of Pier 6.

RECOMMENDATIONS:

(A) Monitor the channel bottom elevations especially around the exposed footings after major flood events and during the biennial inspections.

(B) Monitor the accumulations of timber debris at Piers 6 and 7 during future inspections, and if found to be increasing, removal operations may become warranted.

(C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. If soundings during or after a high water event suggest the presence of scour and increased footing exposure, and underwater inspection may be warranted at that time.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 5270

Feature Crossed: The Red River of the North

Feature Carried: MSAS No. 130

Location: District 4 - Clay County, City of Moorhead

Bridge Description: The superstructure consists of thirteen multiple steel girder spans. The superstructure is supported by two reinforced concrete abutments, nine steel H-pile piers, and three reinforced concrete piers. The footings of all concrete substructure units are supported by timber piles. The substructure units are numbered starting from the west end of the bridge. Piers 6, 7 and 8 carry the spans across the normal river location.

2. INSPECTION DATA

Professional Engineer/Team Leader: Shirley M. Walker, P.E.

Dive Team: Michelle D. Koerbel, Clayton G. Brookins

Date: October 28, 2002

Weather Conditions: Cloudy, "35E F

Underwater Visibility: Negligible/None

Waterway Velocity: "0.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 6 and 7.

General Shape: The pier shafts consist of three multi-sided reinforced concrete columns connected by two narrow reinforced concrete diaphragm walls. The upstream and downstream columns each sit on rectangular pile supported footings.

Maximum Water Depth at Substructure Inspected: Approximately 8.3 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the south end of Pier 7.

Water Surface: The waterline was approximately 24.7 feet below reference.
Waterline Elevation = 870.1.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

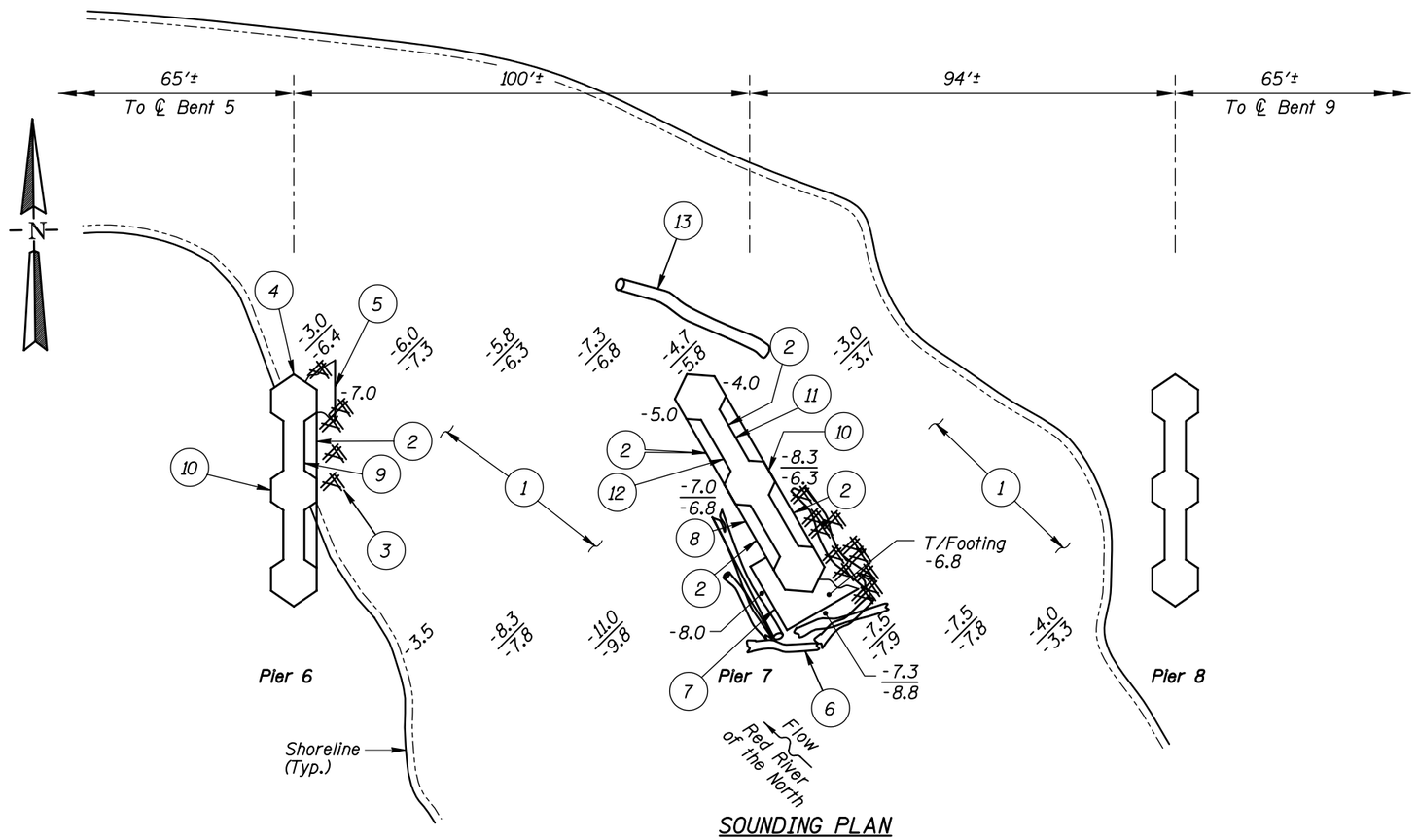
Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/10/02

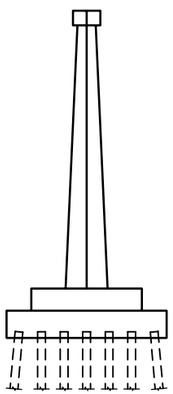
Item 113: Scour Critical Bridges: Code N/96

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes __X__ No



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 6 and 7 were inspected underwater.
2. At the time of inspection on October 28, 2002, the waterline was located approximately 24.7 feet below the top of the pier cap at the upstream end of Pier 7. This corresponds with a waterline elevation of 870.1 based on the previous report dated August 24, 1997.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

(1) The channel bottom material consisted of cobbles, rocks, and concrete rubble up to 2 feet in diameter.

(2) The bottom portion of the concrete diaphragm was exposed 4.5 feet below the waterline on both sides of the pier between the columns.

(3) Light accumulation of timber dbris around Pier 6 on top of the pier cap.

(4) Moderate scaling, 2 feet wide, 1 foot high with 3 inches of penetration was located at the waterline on the east side of the pier with exposed reinforcing steel exhibiting less than 10 percent section loss.

(5) The downstream column footing was exposed with up to 6 inches of vertical exposure.

(6) Moderate accumulation of timbers and timber debris around the upstream nose of Pier 7 extending up to the midpoint of the pier on both sides. Timber sizes were up to 12 inches in diameter.

(7) Exposed footing, located 6.8 feet below the waterline, with up to 1 foot of vertical face exposure.

(8) The bottom of the concrete diaphragm was undermined with up to 6 inches of vertical height.

(9) A vertical crack was observed, up to 1/8 inch wide, extending from waterline to top of cap.

(10) Light to moderate scaling with 1/8 inch typical penetrations and 1/2 inch maximum penetrations was observed from 6 feet above the waterline to the channel bottom on Piers 6 and 7.

(11) A vertical hairline crack was observed from 2 feet above the waterline to the waterline.

(12) A vertical hairline crack was observed in the webwall.

(13) 18 inch diameter log was embedded in the channel bottom by its root ball.

Legend

-2.0 / -5.2 — Sounding Depth from Waterline (10/28/02) / Sounding Depth from Waterline (8/24/97)

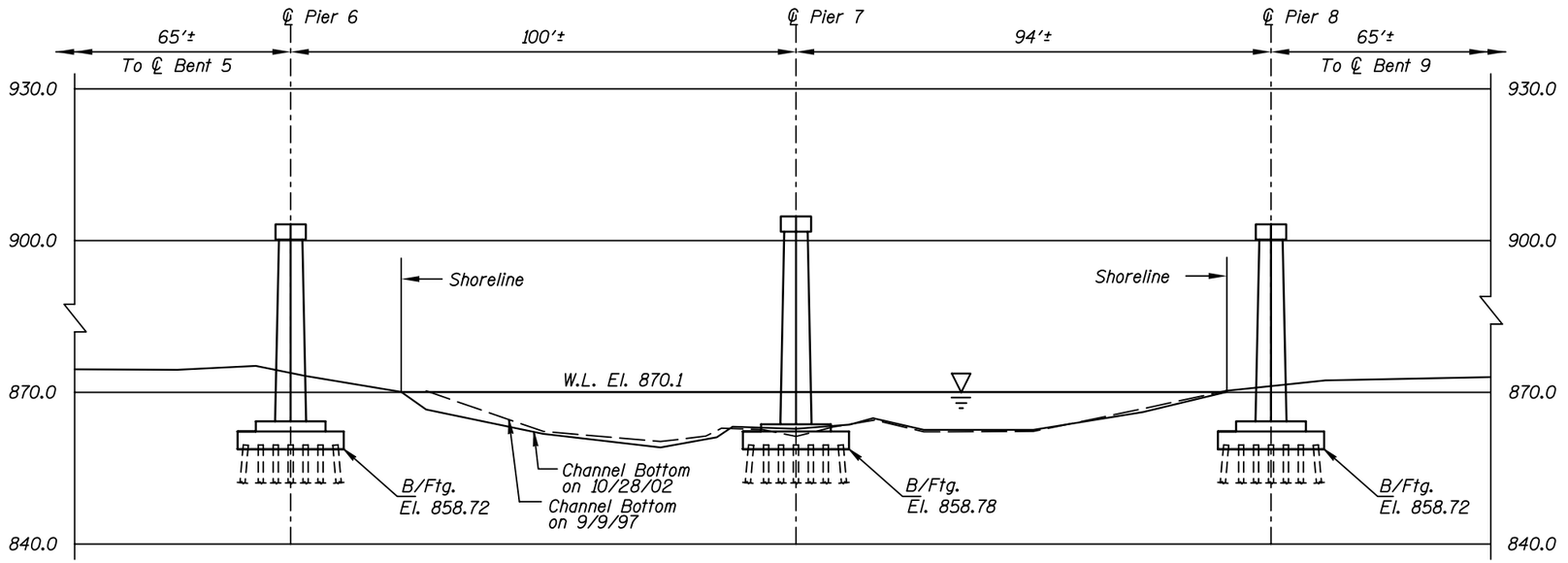
Timber Debris

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

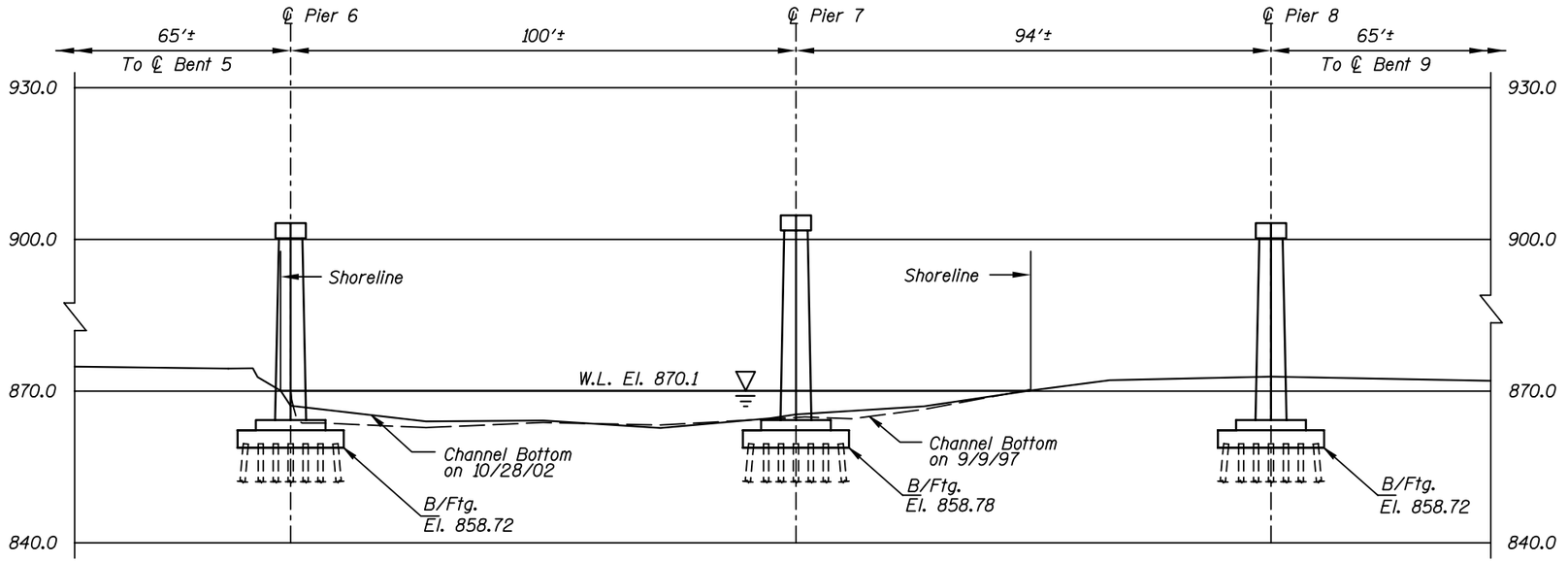
STRUCTURE NO. 5270
OVER THE RED RIVER OF THE NORTH
DISTRICT 4, CLAY COUNTY, CITY OF MOORHEAD

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: OCT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35120046		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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DISTRICT 4, CLAY COUNTY, CITY OF MOORHEAD

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: OCT. 2002
Checked By: PRH	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=30'
Code: 35120046		Figure No.: 2

Photograph 1. Overall View of the Structure, Looking South. Note the Pier's Angle of Attack at Bridge.

Photograph 2. View of Pier 6, Looking West.

Photograph 3. View of Pier 7, Looking Southwest. Note Timber Log in the Forefront that was Embedded in the Channel Bottom.

Photograph 4. View of Pier 8, Looking Southeast.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 28, 2002
ON-SITE TEAM LEADER: Shirley M. Walker, P.E.
BRIDGE NO: 5270 WEATHER: Cloudy, "35E F
WATERWAY CROSSED: The Red River of the North
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
OTHER
PERSONNEL: Michelle D. Koerbel, Clayton G. Brookins
EQUIPMENT: Scuba, U/W Light, Scraper, Sounding Pole, Lead Line, Probe Rod, Camera
TIME IN WATER: 3:55 p.m.
TIME OUT OF WATER: 4:35 p.m.
WATERWAY DATA: VELOCITY "0.5 f.p.s.
VISIBILITY Negligible/None
DEPTH 8.3 feet maximum at Pier 7
ELEMENTS INSPECTED: Piers 6 and 7
REMARKS: The concrete of the piers was generally in good condition with no defects of structural significance. The first step of the footing at the upstream nose of Pier 7 and the downstream nose of Pier 6 was exposed, with 1 vertical foot and 6 vertical inches of footing face exposure at Piers 7 and 6, respectively. The flow of the river was skewed significantly to all piers including the already skewed Pier 7. A moderate accumulation of timber debris was present upstream of Pier 7. A minor accumulation of timber debris was present around Pier 6.

FURTHER ACTION NEEDED: _____ YES __X_____ NO

Monitor the channel bottom elevations especially around the exposed footings after major flood events and during the biennial inspections.

Monitor the accumulations of timber debris at Piers 6 and 7 during future inspections, and if found to be increasing, removal operations may become warranted.

FURTHER ACTION NEEDED (CONTINUED)

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. If soundings during or after a high water event suggest the presence of scour and increased footing exposure, and underwater inspection may be warranted at that time.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 5270
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Shirley M. Walker, P.E.
WATERWAY CROSSED The Rum River

INSPECTION DATE October 28, 2002

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 6	7.0	N	7	7	9	N	7	6	7	6	7	6	7	N	N	7	7	N
	Pier 7	8.3’	N	7	7	9	N	7	6	N	N	6	5	7	N	N	7	N	N

*UNDERWATER PORTION ONLY

REMARKS: The concrete of the piers was generally in good condition with no defects of structural significance. The first step of the footing at the upstream nose of Pier 7 and the downstream nose of Pier 6 was exposed, with 1 vertical foot and 6 vertical inches of footing face exposure at Piers 7 and 6, respectively. The flow of the river was skewed significantly to all piers including the already skewed Pier 7. A moderate accumulation of timber debris was present upstream of Pier 7. A minor accumulation of timber debris was present around Pier 6.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.